【연구논문】

Designing the Machine Age in America: Streamlining in the 20th Century

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A design historian of an earlier generation once remarked that the streamline style of the 1930s exemplified the last moment of cultural coherence enjoyed by inhabitants of the United States. Viewed from the present, across the historical divides of the twentieth century, the decade of the 1930s can appear almost serene in its utopian optimism. There is something profoundly elegiac in historical images of the streamlined New York World's Fair of 1939.[1] For many Americans, however, the Great Depression hardly suggested anything so comforting as coherence. Economic hardship, migrations, political experiments, and threats of fascism and war contributed to a feeling of uncertainty that approached a national identity crisis.

Some Americans looked not to the future but to the past for a sense of national purpose. A desire for continuity found expression in hand-made crafts and in reproductions of colonial furniture. Other

1) For photographs see Richard Wurts, *The New York World's Fair, 1939/1940*, ed. Stanley Appelbaum (New York: Dover, 1977).

signs of Americans looking back to the past included the historical themes of WPA courthouse murals; the popularity of *Gone with the Wind*, Margaret Mitchell's novel of agrarian loss; and the fabrication of such pre-industrial outdoor museums as John D. Rockefeller Jr.'s Colonial Williamsburg and Henry Ford's Greenfield Village. Americans of the Depression years expressed less faith in technological utopia than their descendants might sometimes think.[2)]

But if that is so, then how does one make sense of the artifacts of a machine-age streamline style that still survive from the 1930s-in image and in material reality: all those gleaming smooth-shrouded locomotives, rounded automobiles with teardrop fenders, radio cabinets with glossy black Bakelite plastic curves, "cleanlined" washing machines and refrigerators, all those bus terminals, gas stations, movie theaters, restaurants, and hotels with their streamlines, their curving marquees and horizontal facades of stucco or enamel-steel? How does one reconcile such artifacts with the expressions of despair and longings for tradition that also marked the decade? Did the streamline style's visual coherence and utopian promise embody the aspirations of many Americans, or did streamlining reveal little more than consumer capitalism achieving an awareness of how to stimulate desire and manipulate behavior? From across a gulf of eighty years, it is possible to document the style, its sources, its development, and its survival, much transformed, into the postwar years, but it is not possible to recover the emotions stirred by first sight of a *Zephyr* streamliner streaking along the track.

When the industrial design profession first emerged in the United

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2) See Michael G. Kammen, *Mystic Chords of Memory: The Transformation of Tradition in American Culture* (New York: Knopf, 1991).

States at the end of the 1920s, its practitioners hoped to establish a unique national style for the machine age. Before then, Americans had achieved only a few recognized successes in the field of design, such as the McCormick reaper at the Crystal Palace exhibition in London in 1851 and the Corliss Engine at the Centennial Exhibition in Philadelphia in 1876.[3] Those two unique, iconic machines projected a simplicity so close to pure function that they offered little guidance for the designers of more ordinary objects, and therefore American decorative artists tended to embrace European trends from the colonial period all the way into the twentieth century. Throughout the 1930s, however, American designers struggled to find a machine aesthetic that was both intellectually defensible and commercially viable. They sought a new style to express, honestly and directly, the technological modernity of American life. But they also had to appeal to consumers whose desires often shifted without warning.

The commercial style developed by American designers was streamlining, based on the new science of aerodynamics and borrowing from the emerging technology of aviation, where it was both functional (because essential to efficient flight) and organic (because inspired by natural forms as various as birds, whales, ice floes, even a hen's egg). "To-day, speed is the cry of our era, and greater speed one of the goals of to-morrow." So declared the designer Norman Bel Geddes in his book *Horizons* in 1932.[4] Filled with science-fiction visions of teardrop cars and buses, a tubular train, a torpedo-shaped ocean liner, and a vast flying wing with teardrop pontoons, *Horizons* made an impact on

3) Jeffrey L. Meikle, *Design in the USA* (Oxford: Oxford University Press, 2005), 38-39, 58-59. On the period between the world wars see 88-129.

4) Norman Bel Geddes, *Horizons* (Boston: Little, Brown, 1932), 24.

automotive and railway executives who received promotional copies and on ordinary people who saw its illustrations reproduced in newspapers and magazines. Geddes regarded the teardrop—the shape taken by a drop of water sliding down an inclined surface—as the form of least resistance for a vehicle moving through the air. At about the same time, an annual meeting of the Society of Automotive Engineers gave "unanimous approval" to the idea of a "completely streamline or 'teardrop'" body flowing back over a tapering rear-engine compartment as "the final evolution" in automotive body design.[5] The engineers were reacting to a number of examples of experimental cars. Most revolutionary was the Dymaxion car, first displayed in 1933. Sleek and low, enclosed within a fully curved structural shell of Duralumin alloy, the three-wheeled Dymaxion was a product of the maverick philosopher-designer Buckminster Fuller. Although he planned to manufacture the car commercially, only a few were ever made.

In the meantime, engineers at the Chrysler Motor Company had been conducting wind-tunnel tests of teardrop prototypes with the assistance of Orville Wright, the aviation pioneer. They used illustrations from Geddes's book *Horizons* to convince Chrysler's marketing executives to approve a radically streamlined automobile called the Airflow. Introduced to the market in 1934, the Chrysler Airflow possessed a streamlined silhouette much like that of an elongated Volkswagen, with fenders nearly integrated into the body. A prominent aerodynamic expert with no ties to the Chrysler Company pronounced the Airflow an effective compromise "between ideal aerodynamics and practical automobile design."[6] At first the car excited the auto-buying public,

5) Norman G. Shidle, "From the Annual S.A.E. Meeting at Detroit Come Many New Ideas," *Automotive Industries* 64 (January 31, 1931): 147-49.

but its startling design departed too much from the expected norm. At the New York auto show where Chrysler first displayed the Airflow, market researchers working for competitor General Motors distributed a so-called "Automobile Style Census," asking visitors which new cars had "the most effective streamline treatment," and, more significantly, whether "any of the new models" seemed "too radical or 'freakish.'"[7] Sales of the Airflow were disappointing. Even so, it contributed to growing public enthusiasm for streamlining and convinced both General Motors and Ford to use streamlining as a styling device. GM president Alfred P. Sloan Jr. told stockholders that the value of automotive streamlining was "limited to the question of styling."[8] Detroit's design studios soon became skilled, according to a cynical designer, at "designing for eye resistances rather than wind resistances."[9]

Streamlining's impact on American railroads was just as dramatic. The idea of tapering the shape of a train to reduce wind resistance was first proposed in 1865 by a Unitarian minister, and again in 1892 by an engineer whose ideas were unsuccessfully tested with a train called *Windsplitter*.[10] Railway executives of the 1930s sought to use

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6) Alexander Klemin, "How Research Makes Possible the Modern Motor Car," *Scientific American* 151 (August 1934): 62.

7) *1934 Automobile Style Census* (Detroit: H. G. Weaver, 1934), 14-15. Weaver, head of GM's Customer Research Staff, privately printed the pamphlet to avoid any connection to General Motors.

8) Alfred P. Sloan Jr., printed letter to GM stockholders, December 11, 1934, box 59, Egmont Arens Papers, Special Collections Research Center, Syracuse University Library, Syracuse, NY.

9) Egmont Arens, "Next Year's Cars," *American Magazine of Art* 29 (November 1936): 736.

10) Raymond Loewy, *The Locomotive: Its Aesthetics* (New York: The Studio, 1937), plate 6; Donald J. Bush, *The Streamlined Decade* (New York: George Braziller, 1975), 55-57.

streamlining to win passengers back from the automobile by providing train travel with images of the most up-to-date modernity. As with the Airflow car, Geddes's book *Horizons* played an important role. Shortly after its publication, the Union Pacific railroad and the Burlington railroad each announced plans for the first passenger streamliner. Both completed early in 1934, the Union Pacific's *M-10,000* and the Burlington's *Zephyr* were intended as fast, lightweight, three-car commuter trains. Technologically innovative designs incorporated internal combustion engines and lightweight bodies of aluminum or stainless steel. Their sleek aerodynamic forms attracted much popular attention. During the spring of 1934, both streamliners drew thousands of sightseers on national tours. Some people walked through the trains during brief stops in small towns. Others in rural areas crowded to local grade crossings to watch the trains speed past. Thousands more people saw the two streamliners as star attractions at the Century of Progress Exposition in Chicago. Surrounded by the fair's modernistic Art Deco buildings, the two trains heralded streamlining as a new commercial design style in harmony with the mood of the Depression. To a journalist writing for the mass-circulation *Saturday Evening Post*, the *Zephyr* offered "the first…portent…of change and progress…since the crash of prosperity five years ago."[11]

Public response was so positive that the Burlington railroad ordered a fleet of passenger trains visually similar to the *Zephyr*. Other railroad companies rushed to streamline their rolling stock. Many applied streamline shrouds to existing steam locomotives. A few of these refitted locomotives, such as the New York Central railroad's

11) Garet Garrett, "The Articles of Progress," *Saturday Evening Post* 207 (July 28, 1934): 5.

slant-nosed *Commodore Vanderbilt*, benefited from serious wind-tunnel testing, but a shift from aerodynamic substance to streamline image was almost immediate. In 1936, for example, the designer Henry Dreyfuss refined the basic New York Central design when he shrouded the *Mercury* steam locomotive that pulled the *20th Century Limited* passenger train from New York to Chicago. Otto Kuhler, a designer who specialized in railroad work, used a similar outline but a lighter palette of colors for the Milwaukee railroad. And Raymond Loewy attracted much attention by designing a bullet-nosed shroud for existing steam locomotives for the Pennsylvania railroad. In 1938 the New York Central provided the *20th Century Limited* train with a fleet of new steam locomotives, built from scratch and styled by Dreyfuss in a manner that owed little to wind tunnels and everything to the desire to express power.

Most companies hired an industrial design consultant to give their passenger locomotives a distinct visual identity with a common profile and a unique color scheme coordinated with the interiors of cars and stations. By the end of the decade, General Motors, which had captured the market for diesel locomotives, supplied all railroads with a standard streamline body whose high projective front curved back to a split windshield running the full width of the cab, for the first time affording adequate visibility to locomotive drivers. Given this standard form, designers had to rely on decorative color schemes to distinguish a particular railroad. By then, railway executives had long realized that streamlining for the rail industry was as much a matter of styling as it was for the auto industry. One even argued for careful deployment of "streamlining by optical deception" and suggested that streamliner shrouding should be restyled and replaced on a regular

basis.[12]

Shortly after the emergence of the first streamliners in 1934, the designer Egmont Arens reported an "amazing response" as he toured the Midwestern states with a slide lecture titled "See America Streamlined." He found a "welling up of national enthusiasm" for streamlining, which had "captured [the] American imagination to mean modern, efficient, well-organized, sweet, clean and beautiful." This "crystallization of mass psychology" seemed "to release the wishes and hopes of people in all walks of life whose will and···energy" were previously "chained down by the circumstances of the depression." The overwhelming public response to streamlining suggested that it satisfied a genuine cultural need, but the streamline style also lent itself to commercial manipulation, as Arens recognized when he advised that it be used as a "selling tool."[13] Although the style had evolved from the science of aerodynamics, it quickly passed into the more sensational realm of commerce and culture.

Within a short time (no more than two or three years), the streamline style swept past other expressions of modernity with a metaphoric power so compelling it could not be denied. It became the dominant commercial design style in the U.S., applied to non-vehicular objects at every scale-from radios and vacuum cleaners to store fronts and restaurant interiors. At its most literal, streamlining propelled a

12) L. K. Sillcox, "Savings by Weight Reduction and Streamlining," *Railway Age* 100 (March 14, 1936): 428.

13) Quotations are from a draft of a telegram from Egmont Arens to President Franklin D. Roosevelt, November 14, 1934, box 27; a carbon copy of a letter from Arens to Industries' Sales Committee, November 23, 1934, box 19; and a carbon copy of a letter from Arens letter to Kieth [sic] Morgan, Warm Springs Foundation, November 27, 1934, box 27; all in Arens Papers, Syracuse University Library.

vehicle more quickly or efficiently by eliminating wind resistance. As a commercial metaphor, the streamline style offered a solution to the Depression's major marketing problem, defined by a business psychologist as "the discovery of how to avoid sales resistance, how to discover and sell articles to which there will be the least resistance."[14] According to a design publicist, "streamlining a product and its methods of merchandising is bound to propel it quicker and more profitably through the channels of sales resistance." The same publicist alluded to a more general metaphoric connotation, appropriate for American society as a whole, when he stated that "streamlining a thing strips it for action [and] throws off impediments to progress."[15] The streamline style thus reduced sales resistance by lubricating the flow of goods to consumers, but it also expressed a popular belief that social processes had to be made less complex and more efficient if the nation were to flow smoothly, without friction, out of the chaos of the Depression.

Walter Dorwin Teague, the most philosophical of the American industrial designers, perceived a "new order emerging" to replace widespread social disorder that he traced back to the beginning of the industrial revolution. According to Teague, this new order achieved visual expression in a "quality of line" that was "most highly developed··in a Douglas [DC-3] transport plane" with "the same type of form repeated in the engine and in the fuselage, in the wings and the tail-the same line recurring again and again; that long line with a sharp parabolic curve at the end, which we have come into the habit of calling 'streamline.'"

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14) Henry C. Link, *The New Psychology of Advertising and Selling* (New York: Macmillan, 1934), xiii.

15) William J. Acker, "Design for Business," *Design* 40 (November 1938): 12.

This curve with its "long backward sweep," when repeated among a multitude of objects at all scales of size, gave dynamic expression to the "tensions" and "energy" that Teague celebrated as "characteristic" of the age.[16]

Although Teague regarded beauty as self-evident to anyone with a rational knowledge of function, most designers doubted that function was the defining quality of a machine aesthetic. Paul T. Frankl, for example, wrote that the "art of today…must express the life…of invention, machinery, industry, science and commerce." And Donald R. Dohner admitted that although the "competent designer's forms may not always be exclusively functional, he will always design to express function." More direct about it, Henry Dreyfuss insisted that an "object should look like what it can do." Finally, and most self-consciously, the design partners Barnes & Reinecke completely rejected the concept of "form follows function" and instead considered it their challenge to find "the most economical use of suitable materials…to express…the use of the machine," and in doing so to achieve "visual efficiency." The concept of "visual efficiency" moved the whole point of design away from an object's mechanical function and instead focused attention on its semiotic value-its ability to communicate meaning to those who viewed it.[17]

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16) Walter Dorwin Teague, "Plastics and Design," *Architectural Forum* 72 (February 1940): 93-94.

17) Paul T. Frankl, *New Dimensions: The Decorative Arts of Today in Words & Pictures* (New York: Payson & Clarke, 1928), 16; Donald R. Dohner, "Modern Technique of Designing," *Modern Plastics* 14 (March 1937): 71; Henry Dreyfuss, "Notes for Boston Lecture," March 14, 1933, ms. 1973.15.22(a), Henry Dreyfuss Collection, Cooper-Hewitt, National Design Museum, Smithsonian Institution, New York; and J. F. Barnes and J. O. Reinecke, "Does It Sell?" *Art and Industry* 24 (April 1938): 148.

As a style of product design, streamlining existed not only to express function, perhaps in an exaggerated manner, or to identify a product more generally with the spirit of the age, but also to hide or disguise functional elements whose complexity might otherwise confuse or intimidate consumers. Middle-class Americans were ambivalent about modernity. New technologies had to be domesticated into their environments of use. Camouflaging a new technology in the form of an old one, as when an early automobile resembled a horse-drawn carriage, afforded an easy means of domestication. However, designers used the streamline style to domesticate consumer products without hiding modernity-in fact by emphasizing it instead. Whether the product was a radio or a washing machine, a refrigerator or an automobile, the goal, according to Teague, was to provide a single flowing, visually satisfying shell or housing to encompass and unite a confusing, even chaotic "assemblage of castings, stampings, pipes, rods, gears, [and] controlling instruments" so they would appear "not as so many assembled parts, but as one functioning organism."[18] That last word, "organism," suggests that the streamline style served not only to domesticate but also to naturalize, to make the machine appear as one with nature. The critic Douglas Haskell declared in 1934 that streamlining offered a "superior approach to the whole problem of design" because it renounces "'conquest' by clumsy attempts of sheer force' and instead "coaxes nature, yields, guides, and adapts."[19]

Even so, the streamline style provoked attacks by hostile critics at the Museum of Modern Art who championed the Bauhaus as the

18) Walter Dorwin Teague, *Design This Day: The Technique of Order in the Machine Age* (New York: Harcourt, Brace, 1940), 105.

19) Douglas Haskell, "From Automobile to Road-Plane," *Harper's Monthly Magazine* 169 (July 1934): 173.

source of pure modern design. These two opposed positions went on display in two distinctly different exhibitions in New York in April 1934. Commercial designers were represented in the "Industrial Arts Exposition" at Rockefeller Center, a show organized by the National Alliance of Art and Industry to "celebrate the emergence of an American style" uniting "beauty and sales value."[20] Products on display included Raymond Loewy's streamline pencil sharpener, already on its way to becoming famous, as well as business machines by Dreyfuss and a bathroom scale by Harold Van Doren. Only a few blocks away at the five-year-old Museum of Modern Art, quite a different interpretation of machine-age design was under way. Curated by Philip Johnson, this exhibition, entitled "Machine Art," included only a few token consumer goods. Pride of place went to anonymous industrial products abstracted against neutral backgrounds: a stainless steel ball bearing, the cross section of a wire cable, a gleaming nautical propeller, and laboratory glassware. Johnson's catalogue essay attacked both the "bizarre ornament" of "modernistic" design and the frank "styling" of objects "for advertising." Museum director Alfred H. Barr Jr., on the other hand, assumed a relatively neutral tone in his foreword, emphasizing "the perfection of modern materials and the precision of modern instruments" in an industrial art that relied on "practical application of geometry."[21] Privately, however, in a letter to Norman Bel Geddes, Barr denounced the streamline style as an "absurdity" resulting from a "blind concern with fashion." In his opinion it was "difficult to take the ordinary industrial designer

20) Advertisement for National Alliance of Art and Industry, *Advertising Arts*, January 1934, 48.

21) Philip Johnson, *Machine Art* (New York: Museum of Modern Art, 1934), npag.

seriously."[22]

Defenders of streamlining could have responded that it marked the emergence of a design style that successfully applied the values of modern technology to the needs of a consumer economy. They might have claimed, with some justification, that the streamline style avoided both the decorative excess of French Art Deco and the cold precision of the German Bauhaus aesthetic. In fact, defenders could also have made a case for streamlining on purely technical grounds. Products fabricated from sheet metal, for example, required rounded edges for strength and ease of assembly, while molds for making plastic appliance casings had to be rounded to permit machine polishing of the mold, to facilitate smooth flow of molten plastic to all parts of the mold, and to give finished products a degree of strength not then possible in plastic with rectilinear forms.

Ultimately, however, streamlining remained a popular expressive style. However much industrial designers might invoke transportation machines, their work retained a domestic motivation. In a textbook on industrial design published in 1940, Harold Van Doren told design students that a "manufacturer who wants his laundry tubs…streamlined is in reality asking you to modernize them,…to make cast iron and die-cast zinc and plastics and sheet metal conform to the current taste" for "soft flowing curves."[23] Raymond Loewy claimed to be personally angered by leaky pens and other minor irritants of everyday life, and on one occasion defended his streamlining of a refrigerator because,

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22) Alfred H. Barr Jr., letter to Norman Bel Geddes, December 4, 1934, file 296, Norman Bel Geddes Papers, Harry Ransom Humanities Research Center, University of Texas at Austin.

23) Harold Van Doren, *Industrial Design: A Practical Guide* (New York: McGraw- Hill, 1940), 137-38.

as he claimed, "dust" would "glide…off its smooth, easy surfaces."[24] The design historian Penny Sparke suggests a gendered interpretation when she argues that the streamline style addressed the symbolic needs of women, who had become the primary consumers in American society. In her view, rational standards of the sort promoted by the Museum of Modern Art, which supposedly appealed to "universal values and the pure logic of function," actually marked an attempt "to set the cultural terms of reference for modernity such that women, with their new-found power as consumers, would not take over the reins." Sparke finds it ironic that "the feminisation of technological consumer goods was initiated through that most symbolically masculine of objects, the American automobile." Inverting the usual interpretation of technological symbolism, she argues that by emphasizing "the creation of a visual whole and…concealing the complex mechanisms within," the "aesthetic of streamlining" actually resembled that of the feminized Victorian parlor of the mid-to-late 1800s, in which an "abundance of textiles…disguise[d] the separateness of…component parts" and promoted "continuity and flow."[25]

Although the style's association with aerodynamics and speed suggested a faith in technological progress, its rounded, enclosing forms, especially when applied to architecture, also suggested a need for protection and stability, even stasis. The streamlining of the 1930s revealed an obsession with smooth, frictionless control. This cultural imperative attained its fullest expression at the New York's World's Fair of 1939, which opened, with tragic irony, on the eve of a world war that exposed the

24) Raymond Loewy as paraphrased in "Streamlining-It's Changing the Look of Everything," *Creative Design* 1 (Spring 1935): 22.

25) Penny Sparke, *As Long As It's Pink: The Sexual Politics of Taste* (London: Pandora, 1995), 12, 136, 134.

dark side of the urge for control. Enthusiastic journalists observed that the fair's curvilinear forms, created mostly by industrial designers rather than architects, indicated popular acceptance of streamlining as the national design style. Flowing effortlessly on escalators, revolving platforms, conveyor-belt chairs, and on foot through one-way exhibits ("follow[ing] the line of least resistance just as water does," according to a designer[26]), visitors marveled endlessly at a projected future world of television, talking robots, intercontinental rocket travel, cities transformed in the image of Le Corbusier, and a vast array of currently available streamlined appliances, all enclosed within the sweeping lines of windowless, air-conditioned streamlined buildings.

As it turned out, the New York World's Fair did not herald the final maturity of the American national design style. The fair's visual emphasis on control carried too many echoes of totalitarianism to remain culturally viable after the end of World War II. Responding to an expanding economy and a democratic proliferation of consumer goods during the postwar era, designers and architects offered a new version of strea-mlining, a style evoking limitless forward motion rather than static perfection. If the sweeping lines of the 1930s had terminated with a returning curve of protective enclosure, those of the 1950s ran without visual limit toward an ever-receding horizon.[27]

As in the 1930s, the streamline style of the 1950s was inspired by aerodynamics and flight. And as before, motifs first introduced by automotive designers migrated to less expensive consumer products. By 1955, the new professional journal *Industrial Design* declared Detroit

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26) Walter Dorwin Teague, "Exhibition Technique," *American Architect and Architecture* 151 (September 1937): 33.

27) On postwar design see Meikle, *Design in the USA*, 130-73.

to be "the design center of the U.S.A."[28] Hundreds of young designers, the first generation with specialized training, worked in the large studios of the automakers. A few of them, frustrated by the autocratic rule of Harley Earl, the director of styling at General Motors, left to establish independent consultant offices, or to work for such big-name consultants as Loewy or Teague, or to enter in-house design departments at companies manufacturing everything from housewares to gasoline pumps. As propelled by the automotive industry, the streamlined style of the 1950s exhibited sleek, flaring outlines rather than wide, bulbous curves; long horizontal speed lines accented in chrome; and sharp angles recalling the wings of jet fighters.

During the mid-1950s, readers of *Industrial Design* magazine eagerly awaited editor Deborah Allen's annual review of new models. In 1957, she reported, the new cars were "as expensive, fuel-hungry, space- consuming,…and subject to speedy obsolescence as…ever." Even so, she praised their designers for being "deeply and boldly concerned with form as a means of expression." And that form, according to her, was exploding. "The modern car," she observed, "is designed to look as though it were exploding into space." Its "visual center of gravity" had shifted forward from the middle to the engine, which meant "that everything behind the front…must appear to trail off into space." Unlike the cars of the 1930s and 1940s, which had offered a "fairly literal translation of aerodynamics," the new models did not even "try to withstand the effects of speed." Instead, she wrote almost gleefully, "they disintegrate, and the [slanting angle of the roofline] is a definitive expression of disintegration."[29]

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28) "Why Design in Detroit," *Industrial Design* 2 (October 1955): 36

29) Deborah Allen as quoted by Nigel Whiteley, *Pop Design: Modernism to Mod*

The most expressive popular designs of the 1950s—not only automobiles but also multi-colored plastic radios and televisions, chrome-banded dinette tables with red marbleized Formica tops and matching vinyl-covered tube-steel chairs, kitchen appliances with jet-age brightwork and controls, two-tone vacuum cleaners, and coffee shops, gas stations, and motels with soaring cantilevered roofs—suggested that the expanding material environment could not be contained. Nor could ordinary middle-class Americans who reveled in material goods and used them to escape from larger worries over which they had no control, such as the Cold War and the atomic bomb. As the designer Peter Muller-Munk observed, "behind the yearly change of models and the assertive glitter and smooth shapes of our appliances there is the buoyancy and optimism of a whole people who refuse to accept any condition or product as static and to whom progress, experimentation, and the sheer excitement of production are a necessary part of their self-confidence."[30]

American consumers wanted to be able to invest themselves in their purchases and possessions. They desired products that reflected their own sense of identity. A desirable product communicated something of value above and beyond mere utility. Robert Malone, a staff writer for *Industrial Design* magazine, explained that a new "product romanticism" privileged "the enticement of the eye" over any concern for "consistency" or for "control" of "the product in action." According to Malone, modernism with its emphasis on "structure and simplicity" had "run out of steam" because it did not satisfy a "genuine part of human nature": a delight in that which is "opulent, barbarous,

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(London: Design Council, 1987), 59.

30) Peter Muller-Munk, "'O wad some power the giftie gie us…'", *Arts & Industry* 50 (April 1951): 136.

romantic, and…splendiferous."[31] This delight in the romanticism of the machine also motivated Eero Saarinen, the Finnish American architect who during the 1950s most clearly carried forward and transformed the streamline style of the 1930s. The dominant modernist architects of the postwar era dismissed Saarinen's work as too personal, too flashy. He, on the other hand, struggled to break out of the rationalist grid that dominated American architecture. Indeed he might have contributed an expressionist tone to the later postmodern movement if he had not died prematurely in 1961 at the age of 51.[32]

Saarinen's transmutation of the streamline style can be traced back to the 1930s and earlier. Although design historians have thoroughly documented Saarinen's collaboration with Charles Eames on organic furniture design in 1940, his work for Norman Bel Geddes in 1938 is not well known. Employed as an architectural draftsman in Geddes's industrial design office, Saarinen was largely responsible for the sweeping exterior streamline facades of the General Motors Building at the New York World's Fair. Geddes's meticulous time charts reveal that the young Finnish American architect was also responsible for the design of four commercial facades that were part of a mock-up of a street intersection at the center of the GM Building, included as prophetic of the urban architecture of the future. Saarinen's experience in the Geddes office would have exposed him to the earlier expressionist streamlining of Eric Mendelsohn, one of Geddes's personal heroes,

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31) Robert Malone, "A Review of Ten Years," *Industrial Design* 10 (December 1963): 86, 88-89.

32) On Saarinen in general see Eeva-Liisa Pelkonen and Donald Albrecht, eds., *Eero Saarinen: Shaping the Future* (New Haven: Yale University Press, 2006).

whose sketches and buildings from the 1920s had inspired Geddes's own forays into visionary streamline architecture in the early 1930s.

In any event, Saarinen seems to have absorbed the streamline style while working in the Geddes office. A few years later, in 1945, when General Motors approached him and his father Eliel to design a suburban campus for the GM Technical Center, preliminary renderings included a sweeping curvilinear marquee and a long wing-like structure whose cross-section revealed a teardrop-shaped airfoil. Architectural historians have disparaged these renderings as throwbacks to the commercial styling of the 1930s and have expressed satisfaction that General Motors delayed the project for several years. When the Center finally opened in 1956, designed by Eero Saarinen alone, its straight, clean lines suggested that he had accepted the reigning rationalist doctrine. On the other hand, he also included such bold details as a gleaming stainless steel water tower resembling nothing so much as a world's fair theme center, and a reflective stainless steel dome under which General Motors dramatically introduced its new streamline models every year.

As Saarinen's short career ran its course, he gained his greatest fame for the two projects he regarded as his best work, though neither was completed at the time of his death. Both projects, the TWA airline terminal at what is now Kennedy Airport in New York, and Dulles Airport outside Washington DC, expressed the adventurous spirit of travel by passenger jet at a time when its novelty provoked popular emotions similar to those of the era of the streamliners. The free-form sculptural lines of the TWA terminal, suggesting a bird or even a butterfly spreading its wings at the moment of flight, enclosed an interior whose playfully swooping lines evoked a spaceport of the

future as Hollywood might have portrayed it for a sophisticated science-fiction film. The soaring canopy of Dulles Airport, on the other hand, conveyed a grandeur appropriate to a national gateway used by many airlines. Its gravity-defying lines promised continuous flight along a utopian trajectory whose curve ran forward from the streamlining of the 1920s and 1930s.

Saarinen's air terminals expressed the cultural currents of the 1950s in a manner differing only by degrees of clarity and purity from the flaring tailfins, swooping signs, and chromed details of the era's more common artifacts. If anything, the streamline style gathered momentum during the 1950s, abandoning the desire for protective enclosure of the 1930s and instead conveying a sense of accelerating travel along an open road of limitless progress. Even so, the overreaching hubris of that assumption was implied in the gleaming stainless steel arch that Saarinen designed for a national historical park on the Mississippi River at St. Louis. This so-called Gateway Arch was intended to commemorate the westward expansion of the United States. But the curve of the Arch, rising boldly to its upper limit and then falling back to earth, communicated a sense of limitation that contradicted the official theme. The Arch's upward curve echoed the streamlining of the 1950s, but its downward curve back to earth suggested a weakening of modernity's dream of limitless progress.

Indeed, a loss of faith in progress and a sense of impending limits to growth and expansion haunted Americans during the final decades of the twentieth century. Formerly bustling factory towns sank into decay as industries and jobs moved outside the United States. This is a familiar story that does not need retelling. However, this widely

experienced loss of certainty was accompanied by the appearance of a streamline style that oddly seems to owe more to the 1930s than the 1950s. This revived streamlining seems related to a pervasive general engagement with images and styles from earlier in the twentieth century, a cultural development often referred to as "retro." The critic Fredric Jameson interprets retro as a shallow, surface-oriented immersion in an imagined past whose innocent faith in a future of technological progress is no longer viable.[33] Although a retro look derived from 1930s styling is obvious in the sets of such popular films as *Blade Runner* (1982), *The Matrix* (1999), and *The Dark Knight* (2008), it also permeates the product design and architecture of the past several decades. Unlike movie sets, however, which frankly express a gloomy dystopia, many retro-streamlined consumer goods radiate an innocence so playful that it seems ironic. At times there is something cartoon-like about these products, suggesting escapist toys for a childish generation that no longer knows how to contemplate the future.

As an example of contemporary streamlining, consider the New Beetle automobile, designed by J. Mays, an American, and introduced by Volkswagen in 1998. Although intended to echo the outlines of the original VW sedan, which was an example of 1930s streamlining, the New Beetle is abstracted and stylized, rendered almost as a small toy car molded out of plastic. The intent is to make us smile when we first see it, and then, over the long term, to make us feel comfortable with its chubby but flowing form, which eases momentary escape from the difficult, sometimes unpleasant realm of everyday life. Quite similar to the streamlining of the New Beetle is the curving, bulbous

33) Fredric Jameson, *Postmodernism, or, The Cultural Logic of Late Capitalism* (Durham: Duke University Press, 1991).

form of the original Apple iMac computer, also introduced to the market in 1998. Designed by Jonathan Ive, a British designer who relocated to California to become head of design at Apple, the iMac was sold in an array of bright, candy-like colors. The sensuous surface of its single teardrop-shaped bubble of translucent plastic communicated the sheer fun of computing domesticated and simplified for everyone. Like the streamlined appliance housings of the 1930s, the iMac shell smoothly enclosed a highly complex mechanism, the personal computer, which many people had initially found confusing and difficult. Its non-threatening shape and bright colors conveyed a comforting sense of easy mastery appropriate to a device increasingly experienced not as a business machine but as a medium of entertainment and pleasure. Likewise introduced in 1998 was the Smart car, as rounded and toy-like as the iMac, if not as aerodynamic as the New Beetle. Although the Smart car was a completely European product that many Americans regarded as a joke when it was first introduced, it owed its existence to Nicolas Hayek of Swatch, whose watches, bringing bright colors and disposable styles to a mostly utilitarian device, had proven wildly popular in the United States. Even while the Smart car engaged serious concerns over depletion of fossil fuels and emissions responsible for global warming, it also defused those issues by presenting their solution in the visual vocabulary of a children's picture book.

If this interpretation of contemporary retro streamlining seems to belittle a historical style whose heroic phases had expressed the measured utopian desire of the 1930s and the unlimited material aspirations of the 1950s, then perhaps it would be useful to close by briefly considering the Milwaukee Art Museum, designed by the Spanish architect Santiago

Calatrava and completed in 2001. Widely recognized as a major architectural work, Calatrava's structure stands alone, demanding attention, as did Eric Mendelsohn's TWA terminal forty years before. Even so, it follows in the streamline tradition of not only Saarinen's major work but also Eric Mendelsohn, presenting complex tensed lines experienced simultaneously as both abstract and representational. Whether evoking a futuristic yacht moored on the shore of Lake Michigan, or a sea gull opening its wings on the verge of flying, or a complex computer-modeled abstraction of the concept of flight, the structure delights all those who experience it. Even so, the exhilaration is momentary, ultimately fragmentary, because it does not resonate with other major cultural expressions of its time, but instead with vaguely recalled survivals from decades earlier. Heroic but not iconic, the forms of Calatrava's building do not smooth over the complexities of contemporary life, as did the streamline forms of the 1930s. Nor does it express limitless material progress, as did the streamline forms of the 1950s. Nor, finally, does its spirit resonate with that of streamlined products like the New Beetle, the iMac, or the Smart car, whose playful references to the past suggest that American design-like the culture it reflects-has become too ironic and too fragmented even to pretend to a state of coherence.

WORKS CITED

Acker, William J. "Design for Business." *Design* 40 (November 1938): 12.

Arens, Egmont. "Next Year's Cars." *American Magazine of Art* 29 (November 1936): 730–36.

Arens, Egmont. Papers. Special Collections Research Center, Syracuse University Library, Syracuse, NY.

Barnes, J. F. and J. O. Reinecke. "Does It Sell?" *Art and Industry* 24 (April 1938): 146–50.

Bush, Donald J. *The Streamlined Decade*. New York: George Braziller, 1975.

Dohner, Donald R. "Modern Technique of Designing." *Modern Plastics* 14 (March 1937): 22–25, 71–75.

Dreyfuss, Henry. "Notes for Boston Lecture," March 14, 1933, ms. 1973.15.22(a). Henry Dreyfuss Collection, Cooper–Hewitt, National Design Museum, Smithsonian Institution, New York.

Frankl, Paul T. *New Dimensions: The Decorative Arts of Today in Words & Pictures*. New York: Payson & Clarke, 1928.

Garrett, Garet. "The Articles of Progress." *Saturday Evening Post* 207 (July 28, 1934): 5–7, 55–57, 59.

Geddes, Norman Bel. *Horizons*. Boston: Little, Brown, 1932.

Geddes, Norman Bel. Papers. Harry Ransom Humanities Research Center, University of Texas at Austin.

Haskell, Douglas. "From Automobile to Road–Plane." *Harper's Monthly Magazine* 169 (July 1934): 171–81.

Jameson, Fredric. *Postmodernism, or, The Cultural Logic of Late Capitalism*. Durham: Duke University Press, 1991.

Johnson, Philip. *Machine Art*. New York: Museum of Modern Art, 1934.

Kammen, Michael G. *Mystic Chords of Memory: The Transformation of Tradition in American Culture*. New York: Knopf, 1991.

Klemin, Alexander. "How Research Makes Possible the Modern Motor Car." *Scientific American* 151 (August 1934): 61–63, 107–109.

Link, Henry C. *The New Psychology of Advertising and Selling*. New York:

Macmillan, 1934.

Loewy, Raymond. *The Locomotive: Its Aesthetics*. New York: The Studio, 1937.

Malone, Robert. "A Review of Ten Years." *Industrial Design* 10 (December 1963): 84-89.

Meikle, Jeffrey L. *Design in the USA*. Oxford: Oxford University Press, 2005.

Muller-Munk, Peter. "'O wad some power the giftie gie us…'" *Arts & Industry* 50 (April 1951): 132-37.

National Alliance of Art and Industry advertisement. *Advertising Arts*. January 1934, 48.

1934 Automobile Style Census. Detroit: H. G. Weaver, 1934.

Pelkonen, Eeva-Liisa and Donald Albrecht, eds. *Eero Saarinen: Shaping the Future*. New Haven: Yale University Press, 2006.

Shidle, Norman G. "From the Annual S.A.E. Meeting at Detroit Come Many New Ideas." *Automotive Industries* 64 (January 31, 1931): 147-49.

Sillcox, L. K. "Savings by Weight Reduction and Streamlining." *Railway Age* 100 (March 14, 1936): 425-28.

Sparke, Penny. *As Long As It's Pink: The Sexual Politics of Taste*. London: Pandora, 1995.

"Streamlining-It's Changing the Look of Everything." *Creative Design* 1 (Spring 1935): 20-22.

Teague, Walter Dorwin. *Design This Day: The Technique of Order in the Machine Age*. New York: Harcourt, Brace, 1940.

Teague, Walter Dorwin. "Exhibition Technique." *American Architect and Architecture* 151 (September 1937): 30-34.

Teague, Walter Dorwin. "Plastics and Design." *Architectural Forum* 72 (February 1940): 93-94.

Van Doren, Harold. *Industrial Design: A Practical Guide*. New York: McGraw- Hill, 1940.

Whiteley, Nigel. *Pop Design: Modernism to Mod*. London: Design Council, 1987.

"Why Design in Detroit." *Industrial Design* 2 (October 1955): 36.

Wurts, Richard. *The New York World's Fair, 1939/1940*, ed. Stanley Appelbaum. New York: Dover, 1977

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Abstract

Designing the Machine Age in America: Streamlining in the 20th Century

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Streamlining, the major U.S. commercial design style of the 1930s, was promoted by industrial designers who sought to eliminate sales resistance just as aerodynamic streamlining was intended to eliminate wind resistance. Popularized in 1934 by two passenger trains, the Union Pacific railroad's *M-10,000* and the Burlington railroad's *Zephyr*, the style was introduced into the automotive market through the Chrysler Airflow and was quickly incorporated into non-vehicular consumer products. While 1930s streamlining expressed a cultural desire for stability and stasis during the Great Depression, the postwar variant, exemplified by the sharply angled, flaring automotive tailfin, expressed a popular faith in limitless technological progress. The architect Eero Saarinen, who had learned streamlining in the industrial design office of Norman Bel Geddes in the late 1930s, brought postwar streamlining to full expression in such projects as the TWA terminal in New York and Dulles airport in northern Virginia. During the 1990s a nostalgic retro mode of streamlining appeared in such products as the New Beetle automobile, the first Apple iMac computer, and the Smart car.

Key Words

Industrial Design, Modernism, Eero Saarinen, Streamlining